

REMARKS

Claims 1-16 are pending in the present application. No claims have been amended. Applicants respectfully request reconsideration of the claims in light of the present remarks.

Throughout this *Response*, applicants have cited passages in U.S. Patent No. 5,393,508 to Krempf et al. ("the '508 patent"), which is an English language counterpart of European patent application no. 0 431 998 A1 ("European 0431998"). The '508 patent was previously submitted in an *Information Disclosure Statement* dated October 31, 2001.

I. Rejection of Claims 1-16 Under 35 U.S.C. § 103(a)

Claims 1-16 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,725,421 to Schirmann et al. ("Schirmann '421") in view of European Patent 0 431 998 ("European 0431998"). Applicants respectfully traverse.

a. The Presently Claimed Invention

The present invention is directed to, *inter alia*, a process for manufacturing hydrazine by hydrolizing an azine in which the heat required for the reaction and the separation by distillation of the components is partly provided by the injection of a separate stream of vaporized water into the distillation column. Referring to, *e.g.*, Figure 1 of the present specification, in the process of the present invention, separate streams of water (4) and azine (2), the two reactants, are fed into distillation column (1). Additionally, a second water stream (5) is split off from the first, vaporized in boiler (6), then fed separately into the distillation column. (*See, e.g.*, page 5, lines 1-27 of the specification, claim 1, Figure 1). Thus, the applicants have discovered a new way of minimizing decomposition of the hydrazine product by injecting into the distillation column some of the water required to

hydrolyze azine, this water being in the form of vaporized water, which also supplies additional heat required for the separation by distillation. (See Specification at page 4, line 13 to page 5, line 3).

These additional features are advantageous for several reasons. First, by including the step of injecting the vaporized water required to hydrolyze the azine (and therefore, additional heat) into the distillation column during the reaction, it is possible to lower the temperature in the boiling vessel and/or reduce the surface area, thereby reducing the need for supplying heat from an additional source. (Specification at page 4, line 24 to page 5, line 3). Second, each of lowering the temperature in the boiling vessel and reducing the surface area effectively reduce the decomposition of hydrazine. (Specification at page 5, lines 3-6).

The *Office Action* states that "[i]t would be *prima facie* obvious from European 0431998 to modify the process of Schirmann '421 by employing a distillation column having a boiling vessel, and supplying heat required for the hydrolyzing step and the removing step by such boiling vessel, since Schirmann '421 teaches at column 4, lines 16-19 that the invention permits any fractionating column of a conventional type to be employed, which would include the fractionating column of European 0431998, and one of ordinary skill in the art would be motivated to employ the boiling vessel of European 0431998 in the distillation column of Schirmann '421 in order to minimize the decomposition of hydrazine and to thereby increase the yield of hydrazine for economic purposes." (*Office Action* at page 3). Applicants respectfully disagree.

b. The Burden to Establish *Prima Facie* Obviousness

The Examiner has the burden under § 103 to establish the *prima facie* obviousness of the novel methods claimed in the present application. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Three elements must be shown:

- (1) A particular prior art reference teaches or suggests all of the limitations of the claim challenged;
- (2) A suggestion or motivation exists in the prior art to make any required modification or combination in/of the references cited against the claim; and
- (3) There is a reasonable expectation of success.

MPEP § 2142. Both the suggestion and expectation of success must be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). In particular, teachings of references can be combined only if there is some suggestion or incentive to do so. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1575 (Fed. Cir. 1984). The teaching, suggestion or motivation may not be founded in the applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991) (emphasis added).

Without this teaching, suggestion or motivation, the mere fact that the references can be combined, is insufficient to support an obviousness rejection. See MPEP §2143.01.

"Obvious to try" is not the standard under § 103. Exploration of a new technology or general approach that seems to be a promising field can at the same time be "obvious to try" but legally nonobvious under § 103. *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988). A mere obvious to try is not enough to establish a *prima facie* case of obviousness; there must be a reasonable expectation of success. *Amgen, Inc. v. Chugai Pharmaceutical Co. Ltd.*, 927 F.2d 1200 (Fed. Cir. 1991).

c. Claims 1-16 of the Present Invention Are Not *Prima Facie* Obvious

First, the Schirmann '421 reference neither discloses nor suggests the processes of the present invention. The Office Action acknowledges that "[t]he difference between the process disclosed by Schirmann '421, and that recited in applicants' claims, is that Schirmann '421 does not disclose that the distillation column should have a boiling vessel, and that such boiling vessel should supply heat required for the hydrolyzing step and the removing step." (See Office Action at page 3).

Second, European 0431998 does not cure this defect for at least the following reasons. European 0431998 describes a conventional boiling vessel, as applicants have acknowledged in the Specification of the present invention at page 6, lines 13-17. However, European 0431998 teaches only the purification of the hydrazine hydrate product exiting the distillation column. (See European 0431998 and the '508 patent and, in particular, the Figure of each). In contrast, the present invention provides for a separate stream of vaporized water entering the column in order to increase yield of the product. Nowhere does European 0431998 teach that the yield of hydrazine product can be increased by the addition of a water vapor stream into the distillation column prior to formation of the hydrazine product. European 0431998 is directed to purifying the product after the hydrolyzation reaction, then re-injecting it into the column by means of a loop. (See the '508 patent, column 2, line 66 to column 3, line 9). Thus, European 0431998 also fails to disclose that the distillation column should have a boiling vessel, and that such boiling vessel should supply heat required for the hydrolyzing step and the removing step.

Nowhere does either Schirmann 421 or European 0431998 teach an additional step of injecting into the distillation column a stream of some of the water required to hydrolyze the azine, as described in, e.g., claims 1-16 of the present invention. Therefore, this step is neither disclosed nor suggested by a combination of these two references.

Third, for at least the reasons set forth below, there is no suggestion or motivation within the cited references to combine the teachings of Schirmann '421 and those of European 0431998 to arrive at the presently claimed invention, as recited in, *e.g.*, claims 1-16. One of ordinary skill in the art who wished to minimize the decomposition of hydrazine hydrate would not be motivated to modify the distillation column of Schirmann '421 by adding the boiling vessel taught by European 0431998 (for purifying the product after the hydrolyzation reaction) in order to minimize the decomposition of hydrazine taking place in the boiling vessel. Nowhere does either Schirmann 421 or European 0431998 teach an additional step of injecting into the distillation column a stream of some of the water required to hydrolyze the azine, as described in, *e.g.*, claims 1-16 of the present invention. Therefore, there is no suggestion or motivation within the cited references to combine the teachings of Schirmann '421 and those of European 0431998 to arrive at the presently claimed invention, as recited in, *e.g.*, claims 1-16.

Fourth, even if, only for the sake of argument, one of ordinary skill in the art were to combine the teachings of Schirmann '421 and European 0431998, the teachings of these references provide no reasonable expectation of success in such a combination. A comparison of Figures 1 and 2 in the present Specification shows that Figure 2, an illustration of the prior art, provides no indication that adding the additional stream of vaporized water depicted in Figure 1 (*see* 5 therein) will improve the yield of hydrazine product.

Therefore, for at least the reasons discussed in detail above, applicants submit that a *prima facie* case of obviousness has not been made out and respectfully request that the present rejection be reconsidered and withdrawn.

d. Unexpected Results

If the Examiner has not produced evidence to support a *prima facie* case that an invention is obvious, applicants need not show a case of unexpected or improved results. *In re Oetiker*, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992) ("If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent.").

Although not required in the absence of a *prima facie* case of obviousness, which is absent for at least the reasons discussed in detail above, evidence in the present Specification demonstrates that the process of the present invention is improved over the processes disclosed by the prior art. This is shown by, *e.g.*, Example 1 and Comparative Example 2 of the present Specification. (See Specification at pages 8-10). These Examples show that the present invention makes it possible to reduce the decomposition of hydrazine in the reaction medium by 33%. (Specification at page 10, lines 14-16).

In particular, present Example 1 of the invention demonstrates that the amount of hydrazine hydrate decomposed is 66.9 kg/hour, a loss of only about 4.8% of the hydrazine hydrate. In contrast, Comparative Example 2 demonstrates a loss of 104 kg/hour, or about 7.2% of the hydrazine hydrate, when the process is run according to the teachings of the prior art. Thus, the presently claimed process provides for a hydrazine hydrate loss (only 4.8% in Example 1 of the present invention) that is reduced by 33% from the hydrazine hydrate loss in Comparative Example 2 (7.2%). Such an improvement provided by the presently claimed invention would not have been obvious to one of ordinary skill in the art, for at least the reasons described previously. Thus, the surprising and unexpected improvement offered by the present invention provides further evidence that applicants' claims are not obvious.

Therefore, for at least this additional reason, applicants submit that claims 1-16 are not obvious and respectfully request that the present rejection be reconsidered and withdrawn.

II. Conclusion

For at least the above reasons, applicants respectfully submit that the rejection of claims 1-16 under 35 U.S.C. § 103(a) has been overcome, and respectfully request that it be withdrawn. Therefore, applicants respectfully submit that the claims are now in condition for allowance, early notice of which is earnestly sought.

No fee is believed to be due for this *Response*. If any fee is due, please charge such fee to Pennie & Edmonds, LLP Deposit Account No. 16-1150.

Respectfully submitted,

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